

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 09-312859

(43)Date of publication of application : 02.12.1997

(51)Int.Cl.

H04N 17/02
G09G 5/00
// G06T 1/00

(21)Application number : 08-128588

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(22)Date of filing : 23.05.1996

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(54) IMAGE QUALITY MEASURING DEVICE FOR COLOR DISPLAY DEVICE AND IMAGE QUALITY MEASURING METHOD THEREFOR

(57)Abstract:

PROBLEM TO BE SOLVED: To obtain an image quality measuring device which has a simple structure and is inexpensive by showing an image on a screen of a 1st color display device in a prescribed display part on a display screen of a 2nd color display device.

SOLUTION: A CPU 6 controls a signal generator 12 and displays a pattern image for measurement at each measuring point on a screen of a measured object 1.

The entire pattern image shown on a screen of the object 1 is picked up by a color video camera 2, and the image signal is inputted to an image processing circuit 5.

After the signal is converted into a digital signal in an A/D converter 5A, the digital signal is saved in a frame memory 5B.

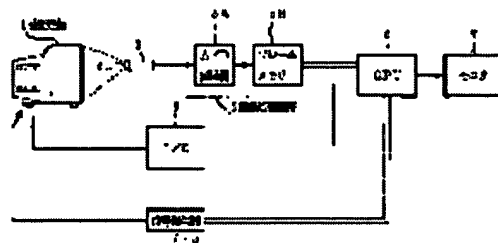
The CPU 6 operates data stored in the

memory 5B, calculates a position of each pattern image and makes a monitor 7 show a

measured result. An operator watches the shown result and adjusts the image quality by

manually adjusting an image quality adjuster of the object 1. On the other hand, the CPU 6

alternatively controls the object 1 and automatically performs image quality adjustment of the object 1 in response to the measured result.



LEGAL STATUS

[Date of request for examination]

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CLAIMS

[Claim(s)]

[Claim 1] The image quality measuring device of a electrochromatic display which is equipped with the following, supplies the picture signal from said color video camera to said 2nd electrochromatic display through said computer, and is characterized by making it display the image of the screen of said 1st electrochromatic display for positioning between said 1st electrochromatic display and said color video cameras on the predetermined display of the display screen of said 2nd electrochromatic display. The color video camera for image quality sensors which picturizes the screen of the 1st electrochromatic display as a device under test The computer which performs image quality measurement based on the picture signal from said color video camera The 2nd electrochromatic display for monitors with which the status signal of the image quality measurement result by said computer is supplied, and a display is performed A picture signal generating means to generate a picture signal required for image quality measurement, and to supply a electrochromatic display based on control of said computer

[Claim 2] The image quality measuring device of the electrochromatic display characterized by making it display the regulation frame to the image of the screen of said 1st electrochromatic display on the predetermined display of the display screen of said 2nd electrochromatic display in the image quality measuring device of a electrochromatic display according to claim 1.

[Claim 3] The screen of the 1st electrochromatic display as a device under test is picturized with the color video camera for image quality sensors. Based on the picture signal from said color video camera, a computer performs image quality measurement and a picture signal generating means is controlled by control of said computer. Make it make said 1st electrochromatic display supply a picture signal required for image quality measurement [means / said / picture signal generating], and said computer is minded for the picture signal from said color video camera. The 2nd electrochromatic display for monitors is supplied. To the predetermined display of the display screen The image quality measuring method of the electrochromatic display characterized by making it display the image of the screen of said 1st electrochromatic display for positioning between said 1st electrochromatic display and said color video cameras.

[Claim 4] The image quality measuring method of the electrochromatic display characterized by making it display the regulation frame to the image of the screen of said electrochromatic display on the predetermined display of the display screen of said 2nd electrochromatic display in the image quality measuring method of a electrochromatic display according to claim 3.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] In case this invention manufactures the product relevant to electrochromatic displays, such as a color television receiver, a color cathode-ray tube for television, a display monitor (color cathode-ray tube for computers), and a projection mold display, it relates to the image quality measuring device and image quality measuring method of a electrochromatic display to be used.

[0002]

[Description of the Prior Art] Below, with reference to drawing 4, the image quality measuring device of the conventional electrochromatic display is explained. 1 is a color television receiver (it has the color cathode-ray tube for television) as a device under test. In addition, electrochromatic displays other than a color television receiver, such as a color cathode-ray tube for television, a display monitor (color cathode-ray tube for computers), and a projection mold display, are possible for a device under test 1.

[0003] The color video camera with which 2 picturizes the whole screen of a device under test 1, and 2L are the zoom lenses as an image pick-up lens of this color video camera, and an image quality sensor (color image quality sensor) consists of this color video camera 2 and fixed focus lens 2L.

[0004] 7V are a video monitor, i.e., the color cathode-ray tube for television, the image pick-up signal (picture signal) from the color video camera 2 is supplied to this, and the screen projects the transverse plane of the color television receiver as a device under test 1.

[0005] 5 is an image-processing circuit and consists of frame memory 5B which memorizes A/D-converter 5A which changes the picture signal from the color video camera 2 into a digital signal, and a digital picture signal. In addition, when a digital picture signal is acquired from the color video camera 2, A/D-converter 5A in the image-processing circuit 5 or the image-processing circuit 5 whole becomes unnecessary. The digital picture signal (image data) by which reading appearance was carried out from frame memory 5B of the image-processing circuit 5 is transmitted to the memory (a graphic display is omitted) of CPU (it has RAM for ROM with which are a central-process unit and the program is remembered to be, and data processing etc.) 6 as a computer through a bus line (two thin lines).

[0006] 7 is a monitor, consists of a color cathode-ray tube for computers, and is connected to CPU 6.

[0007] CPU 6 controls a signal generator 12 through a bus line, generates picture signals, such as a pattern signal required in the case of measurement, supplies the picture signal to the color television receiver 1 as a device under test, and it is made to display an image required for measurement of a pattern image etc. on the tubular surface of a color cathode-ray tube.

[0008] For example, in measurement of drawing distortion (geometric distortion of a screen), it computes the location of an image from image data, and CPU 6 is real time on the screen of a monitor 7 about the measurement result, and graphical display is carried out or it displays measurement data on it numerically. It is made to record on the external memory of CPU 6, for example, a hard disk, (for a graphic display to be omitted), or it transmits to a host computer etc. through a network, and this measurement data may be made to be used for statistics processing etc.

[0009] 9 is an input/output interface and is used for input/output control, such as measurement initiation

in case it connects with CPU6, for example, image quality measurement is performed by the production line, and a terminate signal, generating of the serial control signal used when carrying out regulating automatically of the image quality of a device under test 1, etc.

[0010] Below, with reference to drawing 5, the image quality measuring device of other conventional electrochromatic displays is explained. The conventional example of this drawing 5 is what prepared combination monitor 7K instead of the monitor 7 in the conventional example of drawing 4, and video monitor 7V, and other parts are the same as that of the conventional example of drawing 4.

[0011] He is trying to switch the scan frequency of combination monitor 7K in the conventional example of drawing 5 in the time of the image pick-up signal (picture signal) from the color video camera 2 being supplied to combination monitor 7K, and the time of the status signal based on the image quality measurement result from CPU6 being supplied, using the color cathode-ray tube which can switch scan frequency as combination monitor 7K.

[0012]

[Problem(s) to be Solved by the Invention] In the image quality measuring device of the conventional electrochromatic display of drawing 4, since two sets of monitors are used, there is a fault to which hardware becomes complicated compared with the case where one set of a monitor is used.

[0013] Moreover, since the combination monitor which can switch scan frequency is used with the image quality measuring device of the conventional electrochromatic display of drawing 5 in the time of the image pick-up signal (picture signal) from a color video camera being supplied, and the time of the status signal from CPU being supplied, the price of the image quality measuring device of a electrochromatic display becomes high, and is not desirable.

[0014] Furthermore, since there was no means to decide how the visual field of a color video camera should be set up in it, looking at the image of the transverse plane of the electrochromatic display as a device under test which a monitor projects when the location of a color video camera was adjusted to the image quality measuring device of the conventional electrochromatic display, the experience was required for the visual field setting out.

[0015] this point -- taking an example -- this invention -- configuration simplicity and a price -- it being made cheap and with the image of the screen of the electrochromatic display as a device under test by the image pick-up of the color video camera for positioning between the electrochromatic display as a device under test, and the color video camera for image quality sensors The display of the image quality measurement result by the computer based on the picture signal of the screen of the electrochromatic display as a device under test by the image pick-up of a color video camera It is going to propose the image quality measuring device and image quality measuring method of a electrochromatic display which can be displayed on one electrochromatic display for monitors.

[0016] Moreover, this invention tends to propose the image quality measuring device and image quality ***** of a electrochromatic display which can adjust relative positioning between the electrochromatic display as a device under test, and the color video camera for image quality sensors to ease, quickness, and accuracy.

[0017]

[Means for Solving the Problem] The color video camera for image quality sensors with which this invention picturizes the screen of the 1st electrochromatic display as a device under test, The computer which performs image quality measurement based on the picture signal from the color video camera, The 2nd electrochromatic display for monitors with which the status signal of the image quality measurement result by the computer is supplied, and a display is performed, Based on control of a computer, a picture signal required for image quality measurement is generated. Have a picture signal generating means to supply the 1st electrochromatic display, and a computer is minded for the picture signal from a color video camera. The 2nd electrochromatic display is supplied and it is made to display the image of the screen of the 1st electrochromatic display for positioning between the 1st electrochromatic display and a color video camera on the predetermined display of the display screen of the 2nd electrochromatic display.

[0018] According to this this invention, the picture signal from a color video camera is supplied to the

2nd electrochromatic display through a computer, and the image of the screen of the 1st electrochromatic display for positioning between the 1st electrochromatic display and a color video camera is displayed on the predetermined display of the display screen of the 2nd electrochromatic display.

[0019]

[Embodiment of the Invention] Below, the gestalt of operation of this invention is explained with reference to drawing 1. 1 is a color television receiver (it has the color cathode-ray tube for television) as a device under test. In addition, electrochromatic displays other than a color television receiver, such as a color cathode-ray tube for television, a display monitor (color cathode-ray tube for computers), and a projection mold display, are possible for a device under test 1.

[0020] The color video camera with which 2 picturizes the whole transverse plane of a device under test 1, and 2L are the fixed focus lenses as an image pick-up lens of this color video camera, and an image quality sensor (color image quality sensor) consists of this color video camera 2 and fixed focus lens 2L.

[0021] 5 is an image-processing circuit and consists of frame memory 5B which memorizes A/D-converter 5A which changes the picture signal from the color video camera 2 into a digital signal, and a digital picture signal. In addition, when a digital picture signal is acquired from the color video camera 2, A/D-converter 5A in the image-processing circuit 5 or the image-processing circuit 5 whole becomes unnecessary. The digital picture signal (image data) by which reading appearance was carried out is transmitted to the memory (a graphic display is omitted) of CPU (it has RAM for ROM with which are a central-process unit and the program is remembered to be, and data processing etc.) 6 as a computer through a bus line (two thin lines) from the frame memory 6 of the image-processing circuit 5.

[0022] 7 is a display monitor (color cathode-ray tube for computers), and is connected to CPU 6.

[0023] CPU 6 controls a signal generator 12 through a bus line, generates picture signals, such as a pattern signal required in the case of measurement, supplies the picture signal to the color television receiver 1 as a device under test, and it is made to display an image required for measurement of a pattern image etc. on the tubular surface of a color cathode-ray tube.

[0024] For example, in measurement of drawing distortion (geometric distortion of a screen), it computes the location of an image from image data, and CPU 6 is real time on the screen of a monitor 7 about the measurement result, and graphical display is carried out or it displays measurement data on it numerically. It is made to record on the external memory of CPU 6, for example, a hard disk, (for a graphic display to be omitted), or it transmits to a host computer etc. through a network, and this measurement data may be made to be used for statistics processing etc.

[0025] 9 is an input/output interface and is used for input/output control, such as measurement initiation in case it connects with CPU 6, for example, image quality measurement is performed by the production line, and a terminate signal, generating of the serial control signal used when carrying out regulating automatically of the image quality of a device under test 1, etc.

[0026] Next, image quality measurement of a electrochromatic display 1 and the image quality adjustment of a electrochromatic display 1 based on it are explained. CPU 6 controls a signal generator 12 and the pattern image for measurement is displayed on each point of measurement on the screen of a device under test 1. Subsequently, after picturizing the whole pattern image currently displayed on the screen of a device under test 1 with the color video camera 2, inputting the picture signal into the image-processing circuit 5 and changing into a digital picture signal by A/D-converter 5A, it saves at frame memory 5B. CPU 6 computes the location of each pattern image by calculating the data memorized by frame memory 5B. CPU 6 displays a measurement result on a monitor 7. The result as which the operator was displayed is seen, the hand regulation of the image quality adjustment tab of a device under test 1 are carried out, image quality adjustment is performed, or CPU 6 controls a device under test 1, and image quality adjustment of a device under test 1 is automatically performed according to a measurement result.

[0027] Next, drawing distortion measurement is explained. By control of the signal generator 12 by CPU 6, all the fields of the usual picture area of the color cathode-ray tube of a device under test 1 are

made to emit light, and the edge location of the raster is used as a criteria location of drawing distortion measurement.

[0028] However, with a display monitor (color cathode-ray tube for computers) etc., when the screen is set as under scan mode, a raster screen size becomes smaller than the usual picture area of a color cathode-ray tube, and a device under test 1 does not become settled and cannot use the edge location of the raster which is emitting light as a criteria location of drawing distortion measurement. In that case, it must be based on the edge of the bezel (bezel) of the cabinet of the display monitor (color cathode-ray tube for computers). In that case, using the light source for lighting (the graphic display is omitted), the screen of a device under test 1 is illuminated and measurement of the location of the edge of a bezel is made to be performed easily. In addition, the change in exaggerated scan mode and under scan mode is usually possible for a display monitor (color cathode-ray tube for computers).

[0029] Although a device under test 1 explains a procedure until drawing distortion measurement is started in the case of a display monitor etc. below, when it applies the gestalt of this operation in the production line of an electrochromatic display before that, the circuit needed in the input/output interface circuit 9 is explained with reference to drawing 5. To apply the gestalt of this operation, in the production line of an electrochromatic display, it is necessary to deliver [the judgment signal of whether the device under test 1 came before the color video camera 2 as an image quality sensor or adjustment inspection of image quality needs to be completed, and] and receive the control signal for moving a device under test 1 between the conveyors of a production line. The parallel I/O circuit (a graphic display is omitted) established in the input/output interface circuit 9 is used for I/O of the signal in this case.

[0030] (a) If a device under test 1 is made to move for example, with conveyor equipment and comes before the color video camera 2 first, the measurement start signal from the conveyor equipment will be transmitted to CPU6 through the parallel I/O circuit of the input/output interface circuit 9.

(b) Next, make the light source for lighting turn on by control (software program) of CPU6 before making the screen of a device under test 1 emit light.

(c) According to this light effect, the color video camera 2 can picturize clearly the location of the edge of the bezel of the cabinet of the television set as a device under test 1, and memorize this image in the memory of CPU6 for calculation of the criteria location data of drawing distortion measurement.

(d) Next, display the pattern for measurement on the screen of a device under test 1, and make measurement start by control of the signal generator 12 by control (software program) of CPU6, after turning OFF a switch 11 and making the light source for lighting switch off by control (software program) of CPU6.

[0031] In addition, in measurement of drawing distortion, only the green signal output of the color video camera 2 is used. It turns out that the measurement engine performance in which this is equivalent to a monochrome video camera since green becomes [people's vision sensibility] the highest in three primary colors is obtained.

[0032] Next, although the picture signal from the color video camera 2 is supplied through the image-processing circuit 5 at CPU6 and that main memory (not shown) memorizes at the ** sake of alignment between the electrochromatic display 1 as a device under test, and the color video camera 2, the picture signal memorized by this main memory is made as [rewrite / periodically] by the program of CPU6. And it is sampled, image cutback processing is performed, and the picture signal memorized by main memory is transmitted to the predetermined memory area of the memory for the monitor display display of CPU6 (Video RAM) (not shown), and is displayed on predetermined image pick-up drawing display 7Aa (refer to drawing 2) of a monitor 7 by the program of CPU6.

[0033] Next, with reference to drawing 2, an example of the screen of the monitor 7 connected to CPU6 is explained. In drawing 2, 7A shows the screen which has the profile of the rectangle of this monitor 7. Rectangular image pick-up drawing display 7Aa is set as this screen 7A, and as shown in drawing 3 A later mentioned to this image pick-up drawing display 7Aa, it is made to display the image of the transverse plane of a device under test 1. In addition, after performing centering control between an electrochromatic display 1 and the color video camera 2 and completing it, looking at the display of the

image of the transverse plane of the device under test 1 displayed on this image pick-up drawing display 7Aa, it is diverted to indicating the image quality condition based on the image quality measurement by CPU6 by GURAFFIKKU, or displaying a message.

[0034] Moreover, in drawing 2 A, 7Ab is the meter display of the rectangle of six pieces, as shown in the enlarged drawing of drawing 2 B, a graduation is formed in the lower side side of the profile of the rectangle, and is made as [move / Guide I / to a longitudinal direction / along with the graduation], for example, displays the brightness (BRIGHTNESS: brightness) of the electrochromatic display 1 as a device under test.

[0035] Furthermore, in drawing 2 A, 7Ac is a rectangular cross display, it is for displaying a two-dimensional image quality condition, and as shown in the enlarged drawing of drawing 2 C, the location of the intersection of a total of four straight lines from each side of the profile of cross display 7Ac moves it to level and a perpendicular direction according to an image quality condition. Although the center position of the screen of the electrochromatic display 1 as a device under test serves as level and a vertical two-dimensional element (V. CENTER, H.CENTER), it displays this by cross display 7Ac.

[0036] The display condition of screen 7A of the monitor 7 of drawing 2 is set up by the program of CPU7.

[0037] In drawing 2 A, 7Ad is the message indicator section, and as shown in the enlarged drawing of drawing 2 D, a message, for example, an English text, is displayed on this message indicator section 7Ad. The semantics of the text of English of this message is "too dark [brightness]."

[0038] Drawing 3 A shows the condition that the image I of the transverse plane of a device under test (color television receiver as a electrochromatic display) 1 is displayed on image pick-up drawing display 7Aa of the monitor 7 of drawing 2 .

[0039] drawing 3 B -- image pick-up drawing display 7Aa of the monitor 7 of drawing 2 -- respectively -- the abbreviation for rectangular -- it is made to display the outside and the inside regulation frames Fa and Fb of an analog And the relative position between a device under test 1 and the color video camera 2, i.e., the location of the color video camera 2 to a device under test 1, is adjusted so that the bezel edge frame B of the abbreviation rectangle of the screen of the image I of the transverse plane of the device under test currently displayed on image pick-up drawing display 7A of a monitor 7 may be located between an outside and the inside regulation frames Fa and Fb.

[0040] It is made for drawing 3 C to display the regulation frame F of one rectangle on image pick-up drawing display 7A of the monitor 7 of drawing 2 . And the relative position between a device under test 1 and the color video camera 2, i.e., the location of the color video camera 2 to a device under test 1, is adjusted so that the bezel edge frame B of the abbreviation rectangle of the screen of the image I of the transverse plane of the device under test currently displayed on image pick-up drawing display 7A of a monitor 7 may approach the regulation frame F as much as possible.

[0041]

[Effect of the Invention] The color video camera for image quality sensors which picturizes the screen of the 1st electrochromatic display as a device under test according to the 1st this invention, The computer which performs image quality measurement based on the picture signal from the color video camera, The 2nd electrochromatic display for monitors with which the status signal of the image quality measurement result by the computer is supplied, and a display is performed, Based on control of a computer, a picture signal required for image quality measurement is generated. Have a picture signal generating means to supply the 1st electrochromatic display, and a computer is minded for the picture signal from a color video camera. Since the 2nd electrochromatic display is supplied and it was made to display the image of the screen of the 1st electrochromatic display for positioning between the 1st electrochromatic display and a color video camera on the predetermined display of the display screen of the 2nd electrochromatic display configuration simplicity and a price -- it being made cheap and with the image of the screen of the electrochromatic display as a device under test by the image pick-up of the color video camera for positioning between the electrochromatic display as a device under test, and the color video camera for image quality sensors The image quality measuring device of the electrochromatic display which can display the display of the image quality measurement result by the

computer based on the picture signal of the screen of the electrochromatic display as a device under test by the image pick-up of a color video camera on one electrochromatic display for monitors can be obtained.

[0042] According to the 2nd this invention, it sets for the 1st image quality measuring device and image quality measuring method of a electrochromatic display of this invention. Since it was made to display the regulation frame to the image of the screen of the 1st electrochromatic display on the predetermined display of the display screen of the 2nd electrochromatic display In addition to the effectiveness of the 1st this invention, the alignment of the electrochromatic display as that of a device under test and the color video camera for image quality sensors can obtain ease, quickness, and the image quality measuring device of the electrochromatic display with which it becomes accuracy.

[0043] According to the 3rd this invention, the screen of the 1st electrochromatic display as a device under test is picturized with the color video camera for image quality sensors. Based on the picture signal from the color video camera, a computer performs image quality measurement and a picture signal generating means is controlled by control of a computer. Make it make the 1st electrochromatic display supply a picture signal required for image quality measurement [means / picture signal generating], and a computer is minded for the picture signal from a color video camera. Since the 2nd electrochromatic display for monitors is supplied and it was made to display the image of the screen of the 1st electrochromatic display for positioning between the 1st electrochromatic display and a color video camera on the predetermined display of the display screen configuration simplicity and a price -- it being made cheap and with the image of the screen of the electrochromatic display as a device under test by the image pick-up of the color video camera for positioning between the electrochromatic display as a device under test, and the color video camera for image quality sensors The image quality measuring method of the electrochromatic display which can display the display of the image quality measurement result by the computer based on the picture signal of the screen of the electrochromatic display as a device under test by the image pick-up of a color video camera on one electrochromatic display for monitors can be acquired.

[0044] Since it was made to display the regulation frame to the image of the screen of a electrochromatic display on the predetermined display of the display screen of a display in the 3rd image quality measuring method and image quality measuring method of a electrochromatic display of this invention according to the 4th this invention In addition to the effectiveness of the 3rd this invention, the alignment of a electrochromatic display and the color video camera for image quality sensors can acquire ease, quickness, and the image quality measuring method of the electrochromatic display with which it becomes accuracy as that of a device under test.

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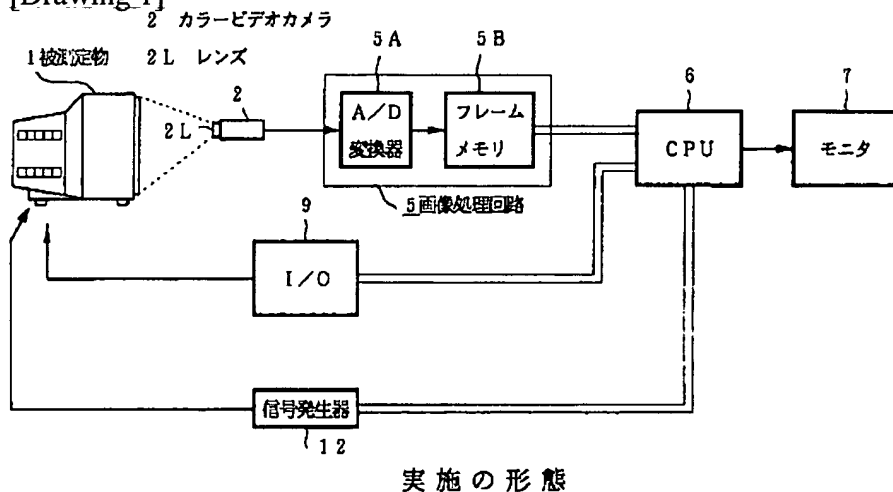
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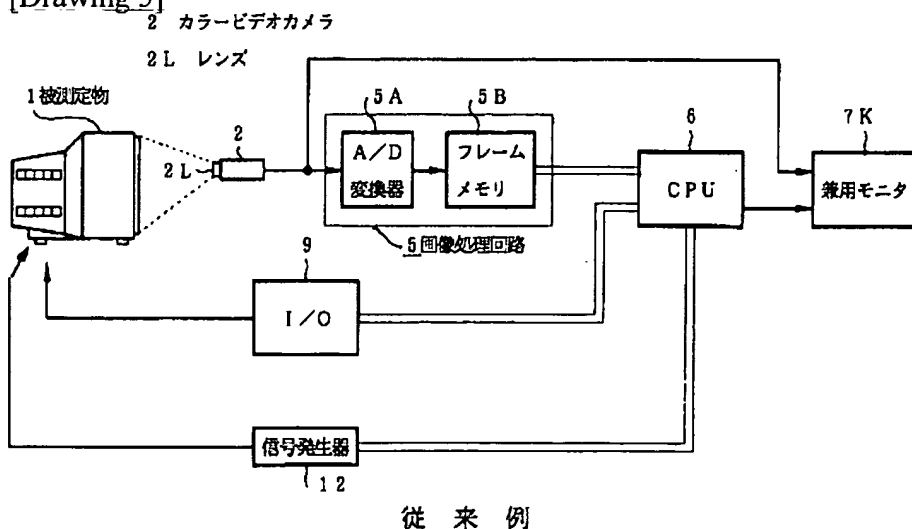
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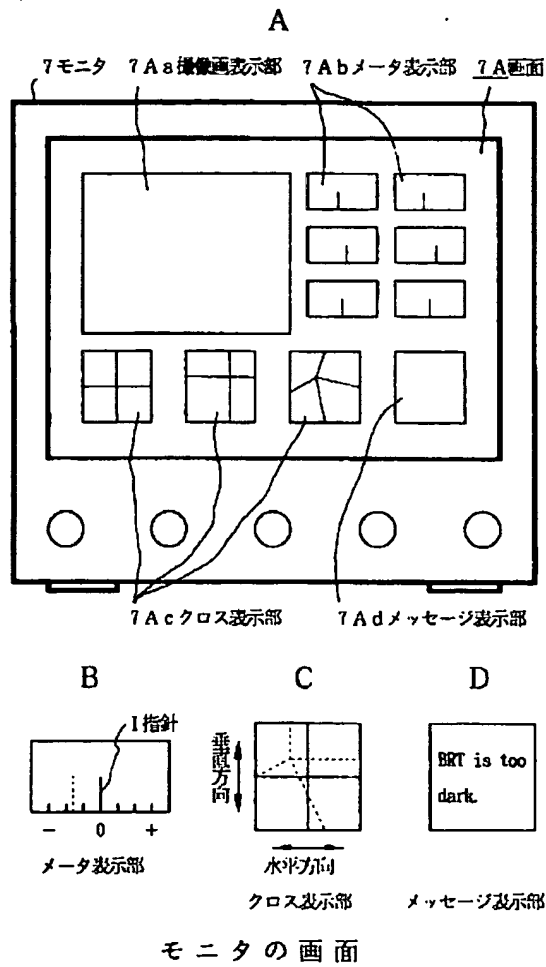
[Drawing 1]



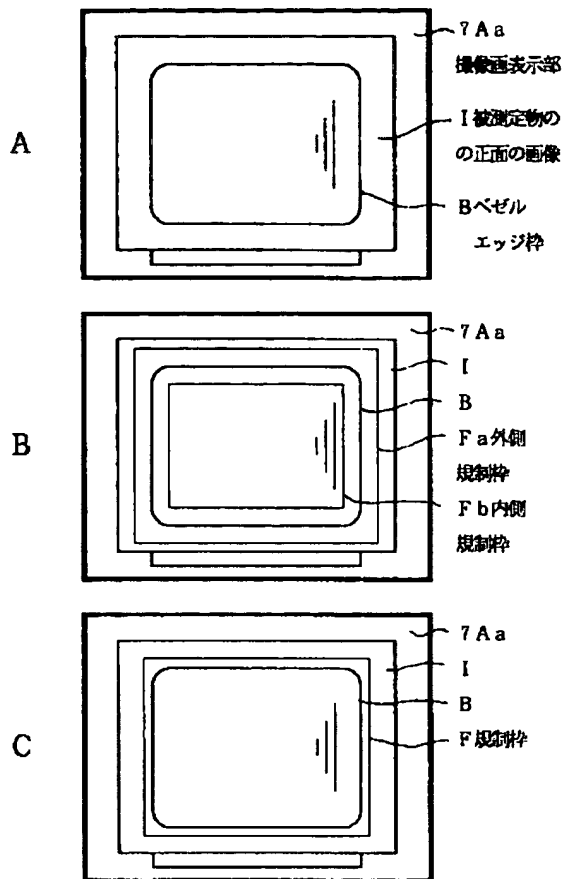
[Drawing 5]



[Drawing 2]

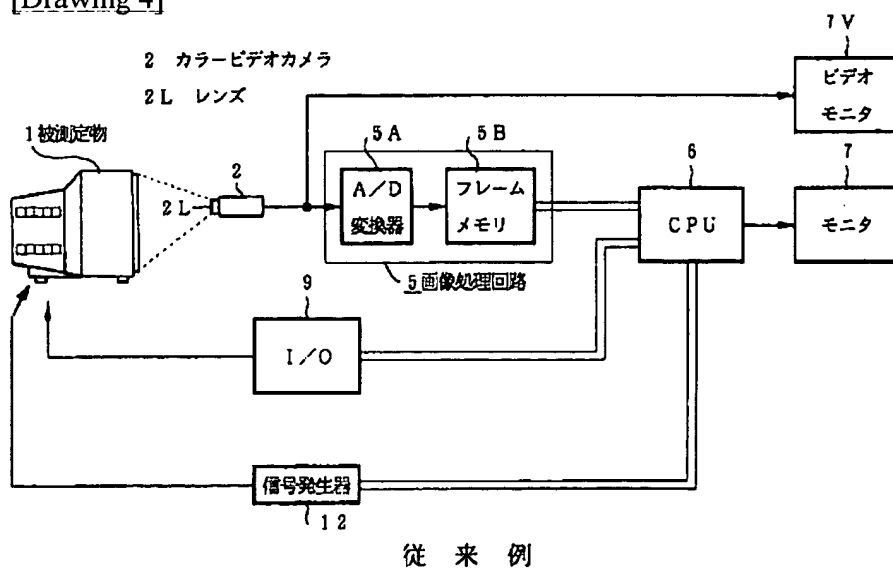


[Drawing 3]



撮像画表示部の表示状態

[Drawing 4]



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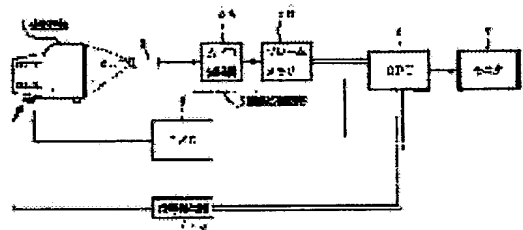
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PROBLEM TO BE SOLVED: To obtain an image quality measuring device which has a simple structure and is inexpensive by showing an image on a screen of a 1st color display device in a prescribed display part on a display screen of a 2nd color display device.

SOLUTION: A CPU 6 controls a signal generator 12 and displays a pattern image for measurement at each measuring point on a screen of a measured object 1. The entire pattern image shown on a screen of the object 1 is picked up by a color video camera 2, and the image signal is inputted to an image processing circuit 5. After the signal is converted into a digital signal in an A/D converter 5A, the digital signal is saved in a frame memory 5B. The CPU 6 operates data stored in the memory 5B, calculates a position of each pattern image and makes a monitor 7 show a measured result. An operator watches the shown result and adjusts the image quality by manually adjusting an image quality adjuster of the object 1. On the other hand, the CPU 6 alternatively controls the object 1 and automatically performs image quality adjustment of the object 1 in response to the measured result.

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CLAIMS

[Claim(s)]

[Claim 1] The color video camera for image quality sensors which picturizes the screen of the 1st electrochromatic display as a device under test, The computer which performs image quality measurement based on the picture signal from said color video camera, The 2nd electrochromatic display for monitors with which the status signal of the image quality measurement result by said computer is supplied, and a display is performed, Based on control of said computer, a picture signal required for image quality measurement is generated. Have a picture signal generating means to supply a electrochromatic display, and said computer is minded for the picture signal from said color video camera. Said 2nd electrochromatic display is supplied. To the predetermined display of the display screen of said 2nd electrochromatic display The image quality measuring device of the electrochromatic display characterized by making it display the image of the screen of said 1st electrochromatic display for justification between said 1st electrochromatic display and said color video cameras.

[Claim 2] The image quality measuring device of the electrochromatic display characterized by making it display the regulation frame to the image of the screen of said 1st electrochromatic display on the predetermined display of the display screen of said 2nd electrochromatic display in the image quality measuring device of a electrochromatic display according to claim 1.

[Claim 3] The screen of the 1st electrochromatic display as a device under test is picturized with the color video camera for image quality sensors. Based on the picture signal from said color video camera, a computer performs image quality measurement and a picture signal generating means is controlled by control of said computer. Make it make said 1st electrochromatic display supply a picture signal required for image quality measurement [means / said / picture signal generating], and said computer is minded for the picture signal from said color video camera. The 2nd electrochromatic display for monitors is supplied. To the predetermined display of the display screen The image quality measuring method of the electrochromatic display characterized by making it display the image of the screen of said 1st electrochromatic display for justification between said 1st electrochromatic display and said color video cameras.

[Claim 4] The image quality measuring method of the electrochromatic display characterized by making it display the regulation frame to the image of the screen of said electrochromatic display on the predetermined display of the display screen of said 2nd electrochromatic display in the image quality measuring method of a electrochromatic display according to claim 3.

[Translation done.]

* NOTICES *

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- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.*** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] In case this invention manufactures the product relevant to electrochromatic displays, such as a color television receiver, a color cathode-ray tube for television, a display monitor (color cathode-ray tube for computers), and a projection mold display, it relates to the image quality measuring device and image quality measuring method of a electrochromatic display to be used.

[0002]

[Description of the Prior Art] Below, with reference to drawing 4, the image quality measuring device of the conventional electrochromatic display is explained. 1 is a color television receiver (it has the color cathode-ray tube for television) as a device under test. In addition, electrochromatic displays other than a color television receiver, such as a color cathode-ray tube for television, a display monitor (color cathode-ray tube for computers), and a projection mold display, are possible for a device under test 1.

[0003] The color video camera with which 2 picturizes the whole screen of a device under test 1, and 2L are the zoom lenses as an image pick-up lens of this color video camera, and an image quality sensor (color image quality sensor) consists of this color video camera 2 and fixed focus lens 2L.

[0004] 7V are a video monitor, i.e., the color cathode-ray tube for television, the image pick-up signal (picture signal) from the color video camera 2 is supplied to this, and the screen projects the transverse plane of the color television receiver as a device under test 1.

[0005] 5 is an image-processing circuit and consists of frame memory 5B which memorizes A/D-converter5A which changes the picture signal from the color video camera 2 into a digital signal, and a digital picture signal. In addition, when a digital picture signal is acquired from the color video camera 2, A/D-converter5A in the image-processing circuit 5 or the image-processing circuit 5 whole becomes unnecessary. The digital picture signal (image data) read from frame memory 5B of the image-processing circuit 5 is transmitted to the memory (illustration is omitted) of CPU (it has RAM for ROM with which are a central-process unit and the program is remembered to be, and data processing etc.)6 as a computer through a bus line (two thin lines).

[0006] 7 is a monitor, consists of a color cathode-ray tube for computers, and is connected to CPU6.

[0007] CPU6 controls a signal generator 12 through a bus line, generates picture signals, such as a pattern signal required in the case of measurement, supplies the picture signal to the color television receiver 1 as a device under test, and it is made to display an image required for measurement of a pattern image etc. on the tubular surface of a color cathode-ray tube.

[0008] For example, in measurement of drawing distortion (geometric distortion of a screen), it computes the location of an image from image data, and CPU6 is real time on the screen of a monitor 7 about the measurement result, and graphical display is carried out or it displays measurement data on it numerically. It is made to record on the external memory of CPU6, for example, a hard disk, (for illustration to be omitted), or it transmits to a host computer etc. through a network, and this measurement data may be made to be used for statistics processing etc.

[0009] 9 is an input/output interface and is used for input/output control, such as measurement initiation in case it connects with CPU6, for example, image quality measurement is performed by the production line, and a terminate signal, generating of the serial control signal used when carrying out regulating automatically of the image quality of a device under test 1, etc.

[0010] Below, with reference to drawing 5, the image quality measuring device of other conventional electrochromatic displays is explained. The conventional example of this drawing 5 is what prepared combination monitor 7K instead of the monitor 7 in the conventional example of drawing 4, and video monitor 7V, and other parts are the same as that of the conventional example of drawing 4.

[0011] He is trying to switch the scan frequency of combination monitor 7K in the conventional example of drawing 5 in the time of the image pick-up signal (picture signal) from the color video camera 2 being supplied to combination monitor 7K, and the time of the status signal based on the image quality measurement result from CPU6 being supplied, using the color cathode-ray tube which can switch scan frequency as combination monitor 7K.

[0012]

[Problem(s) to be Solved by the Invention] In the image quality measuring device of the conventional electrochromatic display of drawing 4, since two sets of monitors are used, there is a fault to which hardware becomes complicated compared with the case where one set of a monitor is used.

[0013] Moreover, since the combination monitor which can switch scan frequency is used with the image quality measuring device of the conventional electrochromatic display of drawing 5 in the time of the image pick-up signal (picture signal) from a color video camera being supplied, and the time of the status signal from CPU being supplied, the price of the image quality measuring device of a electrochromatic display becomes high, and is not desirable.

[0014] Furthermore, since there was no means to decide how the visual field of a color video camera should be set up in it, looking at the image of the transverse plane of the electrochromatic display as a device under test which a monitor projects when the location of a color video camera was adjusted to the image quality measuring device of the conventional electrochromatic display, experience was required for the visual field setup.

[0015] this point — taking an example — this invention — configuration simplicity and a price — it being made cheap and with the image of the screen of the electrochromatic display as a device under test by the image pick-up of the color video camera for justification between the electrochromatic display as a device under test, and the color video camera for image quality sensors The display of the image quality measurement result by the computer based on the picture signal of the screen of the electrochromatic display as a device under test by the image pick-up of a color video camera It is going to propose the image quality measuring device and image quality measuring method of a electrochromatic display which can be displayed on one electrochromatic display for monitors.

[0016] Moreover, this invention tends to propose the image quality measuring device and image quality ***** of ease and the electrochromatic display which can be adjusted quickness and correctly for relative positioning between the electrochromatic display as a device under test, and the color video camera for image quality sensors.

[0017]

[Means for Solving the Problem] The color video camera for image quality sensors with which this invention picturizes the screen of the 1st electrochromatic display as a device under test, The computer which performs image quality measurement based on the picture signal from the color video camera, The 2nd electrochromatic display for monitors with which the status signal of the image quality measurement result by the computer is supplied, and a display is performed, Based on control of a computer, a picture signal required for image quality measurement is generated. Have a picture signal generating means to supply the 1st electrochromatic display, and a computer is minded for the picture signal from a color video camera. The 2nd electrochromatic display is supplied and it is made to display the image of the screen of the 1st electrochromatic display for justification between the 1st electrochromatic display and a color video camera on the predetermined display of the display screen of the 2nd electrochromatic display.

[0018] According to this this invention, the picture signal from a color video camera is supplied to the 2nd electrochromatic display through a computer, and the image of the screen of the 1st electrochromatic display for justification between the 1st electrochromatic display and a color video camera is displayed on the predetermined display of the display screen of the 2nd electrochromatic display.

[0019]

[Embodiment of the Invention] Below, the gestalt of operation of this invention is explained with reference to drawing 1 . 1 is a color television receiver (it has the color cathode-ray tube for television) as a device under test. In addition, electrochromatic displays other than a color television receiver, such as a color cathode-ray tube for television, a display monitor (color cathode-ray tube for computers), and a projection mold display, are possible for a device under test 1.

[0020] The color video camera with which 2 picturizes the whole transverse plane of a device under test 1, and 2L are the fixed focus lenses as an image pick-up lens of this color video camera, and an image quality sensor (color image quality sensor) consists of this color video camera 2 and fixed focus lens 2L.

[0021] 5 is an image-processing circuit and consists of frame memory 5B which memorizes A/D-converter5A which changes the picture signal from the color video camera 2 into a digital signal, and a digital picture signal. In addition, when a digital picture signal is acquired from the color video camera 2, A/D-converter5A in the image-processing circuit 5 or the image-processing circuit 5 whole becomes unnecessary. The digital picture signal (image data) read from the frame memory 6 of the image-processing circuit 5 is transmitted to the memory (illustration is omitted) of CPU (it has RAM for ROM with which are a central-process unit and the program is remembered to be, and data processing etc.)6 as a computer through a bus line (two thin lines).

[0022] 7 is a display monitor (color cathode-ray tube for computers), and is connected to CPU6.

[0023] CPU6 controls a signal generator 12 through a bus line, generates picture signals, such as a pattern signal required in the case of measurement, supplies the picture signal to the color television receiver 1 as a device under test, and it is made to display an image required for measurement of a pattern image etc. on the tubular surface of a color cathode-ray tube.

[0024] For example, in measurement of drawing distortion (geometric distortion of a screen), it computes the location of an image from image data, and CPU6 is real time on the screen of a monitor 7 about the measurement result, and graphical display is carried out or it displays measurement data on it numerically. It is made to record on the external memory of CPU6, for example, a hard disk, (for illustration to be omitted), or it transmits to a host computer etc. through a network, and this measurement data may be made to be used for statistics processing etc.

[0025] 9 is an input/output interface and is used for input/output control, such as measurement initiation in case it connects with CPU6, for example, image quality measurement is performed by the production line, and a terminate signal, generating of the serial control signal used when carrying out regulating automatically of the image quality of a device under test 1, etc.

[0026] Next, image quality measurement of a electrochromatic display 1 and the image quality adjustment of a

electrochromatic display 1 based on it are explained. CPU6 controls a signal generator 12 and the pattern image for measurement is displayed on each point of measurement on the screen of a device under test 1. Subsequently, after picturizing the whole pattern image currently displayed on the screen of a device under test 1 with the color video camera 2, inputting the picture signal into the image-processing circuit 5 and changing into a digital picture signal by A/D-converter 5A, it saves at frame memory 5B. CPU6 computes the location of each pattern image by calculating the data memorized by frame memory 5B. CPU6 displays a measurement result on a monitor 7. The result as which the operator was displayed is seen, the hand regulation of the image quality adjustment tab of a device under test 1 are carried out, image quality adjustment is performed, or CPU6 controls a device under test 1, and image quality adjustment of a device under test 1 is automatically performed according to a measurement result.

[0027] Next, drawing distortion measurement is explained. By control of the signal generator 12 by CPU6, all the fields of the usual picture area of the color cathode-ray tube of a device under test 1 are made to emit light, and the edge location of the raster is used as a criteria location of drawing distortion measurement.

[0028] However, with a display monitor (color cathode-ray tube for computers) etc., when the screen is set as under scan mode, a raster screen size becomes smaller than the usual picture area of a color cathode-ray tube, and a device under test 1 does not become settled and cannot use the edge location of the raster which is emitting light as a criteria location of drawing distortion measurement. In that case, it must be based on the edge of the bezel (bezel) of the cabinet of the display monitor (color cathode-ray tube for computers). In that case, using the light source for lighting (illustration is omitted), the screen of a device under test 1 is illuminated and measurement of the location of the edge of a bezel is made to be performed easily. In addition, the change in exaggerated scan mode and under scan mode is usually possible for a display monitor (color cathode-ray tube for computers).

[0029] Although a device under test 1 explains a procedure until drawing distortion measurement is started in the case of a display monitor etc. below, when it applies the gestalt of this operation in the production line of a electrochromatic display before that, the circuit needed in the input/output interface circuit 9 is explained with reference to drawing 5. To apply the gestalt of this operation, in the production line of a electrochromatic display, it is necessary to deliver [the judgment signal of whether the device under test 1 came before the color video camera 2 as an image quality sensor or adjustment inspection of image quality needs to be completed, and] and receive the control signal for moving a device under test 1 between the conveyors of a production line. The parallel I/O circuit (illustration is omitted) established in the input/output interface circuit 9 is used for I/O of the signal in this case.

[0030] (a) If a device under test 1 is made to move for example, with conveyor equipment and comes before the color video camera 2 first, the measurement start signal from the conveyor equipment will be transmitted to CPU6 through the parallel I/O circuit of the input/output interface circuit 9.

(b) Next, make the light source for lighting turn on by control (software program) of CPU6 before making the screen of a device under test 1 emit light.

(c) According to this light effect, the color video camera 2 can picturize clearly the location of the edge of the bezel of the cabinet of the television set as a device under test 1, and memorize this image in the memory of CPU6 for calculation of the criteria location data of drawing distortion measurement.

(d) Next, display the pattern for measurement on the screen of a device under test 1, and make measurement start by control of the signal generator 12 by control (software program) of CPU6, after turning OFF a switch 11 and making the light source for lighting switch off by control (software program) of CPU6.

[0031] In addition, in measurement of drawing distortion, only the green signal output of the color video camera 2 is used. It turns out that the measurement engine performance in which this is equivalent to a monochrome video camera since green becomes [people's vision sensibility] the highest in three primary colors is obtained.

[0032] Next, although the picture signal from the color video camera 2 is supplied through the image-processing circuit 5 at CPU6 and that main memory (not shown) memorizes at the ** sake of alignment between the electrochromatic display 1 as a device under test, and the color video camera 2, the picture signal memorized by this main memory is made as [rewrite / periodically] by the program of CPU6. And it is sampled, image contraction processing is performed, and the picture signal memorized by main memory is transmitted to the predetermined memory area of the memory for the monitor display display of CPU6 (Video RAM) (not shown), and is displayed on predetermined image pick-up drawing display 7Aa (refer to drawing 2) of a monitor 7 by the program of CPU6.

[0033] Next, with reference to drawing 2, an example of the screen of the monitor 7 connected to CPU6 is explained. In drawing 2 A, 7A shows the screen which has the profile of the rectangle of this monitor 7. Rectangular image pick-up drawing display 7Aa is set as this screen 7A, and as shown in drawing 3 A later mentioned to this image pick-up drawing display 7Aa, it is made to display the image of the transverse plane of a device under test 1. In addition, after performing centering control between a electrochromatic display 1 and the color video camera 2 and completing it, looking at the display of the image of the transverse plane of the device under test 1 displayed on this image pick-up drawing display 7Aa, it is diverted to indicating the image quality condition based on the image quality measurement by CPU6 by GURAFFIKKU, or displaying a message.

[0034] Moreover, in drawing 2 A, 7Ab is the meter display of the rectangle of six pieces, as shown in the enlarged drawing of drawing 2 B, a graduation is formed in the lower side side of the profile of the rectangle, and is made as [move / Guide I / to a longitudinal direction / along with the graduation], for example, displays the brightness (BRIGHTNESS: brightness) of the electrochromatic display 1 as a device under test.

[0035] Furthermore, in drawing 2 A, 7Ac is a rectangular cross display, it is for displaying a two-dimensional image quality condition, and as shown in the enlarged drawing of drawing 2 C, the location of the intersection of a total of

four straight lines from each side of the profile of cross display 7Ac moves it to level and a perpendicular direction according to an image quality condition. Although the center position of the screen of the electrochromatic display 1 as a device under test serves as level and a vertical two-dimensional element (V. CENTER, H.CENTER), it displays this by cross display 7Ac.

[0036] The display condition of screen 7A of the monitor 7 of drawing 2 is set up by the program of CPU7.

[0037] In drawing 2 A, 7Ad is the message indicator section, and as shown in the enlarged drawing of drawing 2 D, a message, for example, an English text, is displayed on this message indicator section 7Ad. The semantics of the text of English of this message is "too dark [brightness]."

[0038] Drawing 3 A shows the condition that the image I of the transverse plane of a device under test (color television receiver as a electrochromatic display) 1 is displayed on image pick-up drawing display 7Aa of the monitor 7 of drawing 2 .

[0039] drawing 3 B — image pick-up drawing display 7Aa of the monitor 7 of drawing 2 — respectively — the abbreviation for rectangular — it is made to display the outside and the inside regulation frames Fa and Fb of an analog And the relative position between a device under test 1 and the color video camera 2, i.e., the location of the color video camera 2 to a device under test 1, is adjusted so that the bezel edge frame B of the abbreviation rectangle of the screen of the image I of the transverse plane of the device under test currently displayed on image pick-up drawing display 7A of a monitor 7 may be located between an outside and the inside regulation frames Fa and Fb.

[0040] It is made for drawing 3 C to display the regulation frame F of one rectangle on image pick-up drawing display 7A of the monitor 7 of drawing 2 . And the relative position between a device under test 1 and the color video camera 2, i.e., the location of the color video camera 2 to a device under test 1, is adjusted so that the bezel edge frame B of the abbreviation rectangle of the screen of the image I of the transverse plane of the device under test currently displayed on image pick-up drawing display 7A of a monitor 7 may approach the regulation frame F as much as possible.

[0041]

[Effect of the Invention] The color video camera for image quality sensors which picturizes the screen of the 1st electrochromatic display as a device under test according to the 1st this invention, The computer which performs image quality measurement based on the picture signal from the color video camera, The 2nd electrochromatic display for monitors with which the status signal of the image quality measurement result by the computer is supplied, and a display is performed, Based on control of a computer, a picture signal required for image quality measurement is generated. Have a picture signal generating means to supply the 1st electrochromatic display, and a computer is minded for the picture signal from a color video camera. Since the 2nd electrochromatic display is supplied and it was made to display the image of the screen of the 1st electrochromatic display for justification between the 1st electrochromatic display and a color video camera on the predetermined display of the display screen of the 2nd electrochromatic display configuration simplicity and a price — it being made cheap and with the image of the screen of the electrochromatic display as a device under test by the image pick-up of the color video camera for justification between the electrochromatic display as a device under test, and the color video camera for image quality sensors The image quality measuring device of the electrochromatic display which can display the display of the image quality measurement result by the computer based on the picture signal of the screen of the electrochromatic display as a device under test by the image pick-up of a color video camera on one electrochromatic display for monitors can be obtained.

[0042] According to the 2nd this invention, it sets for the 1st image quality measuring device and image quality measuring method of a electrochromatic display of this invention. Since it was made to display the regulation frame to the image of the screen of the 1st electrochromatic display on the predetermined display of the display screen of the 2nd electrochromatic display In addition to the effectiveness of the 1st this invention, the alignment of the electrochromatic display as that of a device under test and the color video camera for image quality sensors can obtain ease and the image quality measuring device of the electrochromatic display which becomes quickness and exact.

[0043] According to the 3rd this invention, the screen of the 1st electrochromatic display as a device under test is picturized with the color video camera for image quality sensors. Based on the picture signal from the color video camera, a computer performs image quality measurement and a picture signal generating means is controlled by control of a computer. Make it make the 1st electrochromatic display supply a picture signal required for image quality measurement [means / picture signal generating], and a computer is minded for the picture signal from a color video camera. Since the 2nd electrochromatic display for monitors is supplied and it was made to display the image of the screen of the 1st electrochromatic display for justification between the 1st electrochromatic display and a color video camera on the predetermined display of the display screen configuration simplicity and a price — it being made cheap and with the image of the screen of the electrochromatic display as a device under test by the image pick-up of the color video camera for justification between the electrochromatic display as a device under test, and the color video camera for image quality sensors The image quality measuring method of the electrochromatic display which can display the display of the image quality measurement result by the computer based on the picture signal of the screen of the electrochromatic display as a device under test by the image pick-up of a color video camera on one electrochromatic display for monitors can be acquired.

[0044] Since it was made to display the regulation frame to the image of the screen of a electrochromatic display on the predetermined display of the display screen of a display in the 3rd image quality measuring method and image

quality measuring method of a electrochromatic display of this invention according to the 4th this invention In addition to the effectiveness of the 3rd this invention, the alignment of a electrochromatic display and the color video camera for image quality sensors can acquire ease and the image quality measuring method of the electrochromatic display which becomes quickness and exact as that of a device under test.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the block diagram showing the gestalt of operation of this invention.

[Drawing 2] It is the diagram showing the screen of the monitor of the gestalt of the operation.

[Drawing 3] It is the diagram showing the display condition of the monitor of the gestalt of the operation.

[Drawing 4] It is the block diagram showing the conventional example of the image quality measuring device of a electrochromatic display.

[Drawing 5] It is the block diagram showing other conventional examples of the image quality measuring device of a electrochromatic display.

[Description of Notations]

1 A device under test (electrochromatic display), 2 The color video camera for image quality sensors, 5 image-processing circuits, 6 CPU, 7 A monitor, 9 An input/output interface, 12 signal generators.

[Translation done.]

(19) 日本国特許庁 (J P)

(12) 公開特許公報 (A)

(11) 特許出願公開番号

特開平9-312859

(43) 公開日 平成9年(1997)12月2日

(51) Int.Cl. ⁶	識別記号	庁内整理番号	F I	技術表示箇所
H 0 4 N	17/02		H 0 4 N 17/02	Z
G 0 9 G	5/00		G 0 9 G 5/00	X
// G 0 6 T	1/00		G 0 6 F 15/62	3 8 0

審査請求 未請求 請求項の数4 O L (全 7 頁)

(21) 出願番号 特願平8-128588

(22) 出願日 平成8年(1996)5月23日

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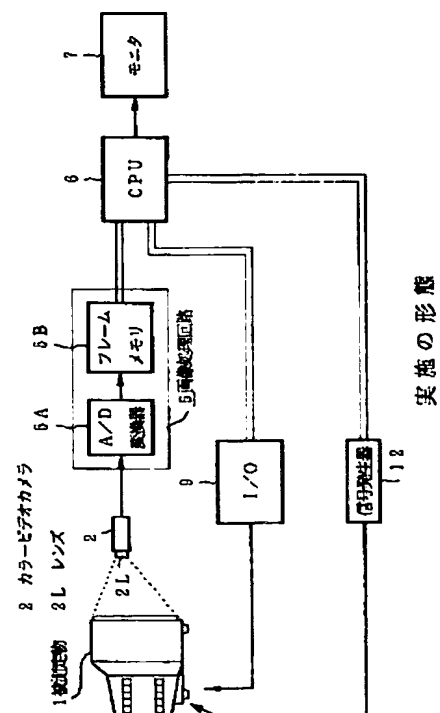
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(54) 【発明の名称】 カラー表示装置の画質測定装置及び画質測定方法

(57) 【要約】 (修正有)

【課題】 カラー表示装置の画面の画像と、その画面の画像信号に基づく画質測定結果の表示とを、1個のモニタに表示させることのできるカラー表示装置の画質測定装置を得る。

【解決手段】 カラービデオカメラ2からの画像信号をコンピュータ6を介して、第2のカラー表示装置7に供給して、第2のカラー表示装置7の表示画面の所定表示部に、第1のカラー表示装置1とカラービデオカメラ2との間の位置調整のための第1のカラー表示装置1の画面の画像を表示させるようにする。



(2)

1

【特許請求の範囲】

【請求項1】 被測定物としての第1のカラー表示装置の画面を撮像する画質センサ用のカラービデオカメラと、
前記カラービデオカメラからの画像信号に基づいて、画質測定を行うコンピュータと、
前記コンピュータによる画質測定結果の表示信号が供給されて表示が行われるモニタ用の第2のカラー表示装置と、
前記コンピュータの制御に基づいて、画質測定に必要な画像信号を発生して、カラー表示装置に供給する画像信号発生手段とを有し、
前記カラービデオカメラからの画像信号を前記コンピュータを介して、前記第2のカラー表示装置に供給して、
前記第2のカラー表示装置の表示画面の所定表示部に、
前記第1のカラー表示装置と前記カラービデオカメラとの間の位置調整のための前記第1のカラー表示装置の画面の画像を表示させるようにしたことを特徴とするカラー表示装置の画質測定装置。

【請求項2】 請求項1に記載のカラー表示装置の画質測定装置において、
前記第2のカラー表示装置の表示画面の所定表示部に、
前記第1のカラー表示装置の画面の画像に対する規制枠を表示させるようにしたことを特徴とするカラー表示装置の画質測定装置。

【請求項3】 被測定物としての第1のカラー表示装置の画面を画質センサ用のカラービデオカメラによって撮像し、
前記カラービデオカメラからの画像信号に基づいて、コンピュータによって画質測定を行い、
前記コンピュータの制御によって画像信号発生手段を制御して、前記画像信号発生手段よりの画質測定に必要な画像信号を前記第1のカラー表示装置に供給させるようにし、
前記カラービデオカメラからの画像信号を前記コンピュータを介して、モニタ用の第2のカラー表示装置に供給して、その表示画面の所定表示部に、前記第1のカラー表示装置と前記カラービデオカメラとの間の位置調整のための前記第1のカラー表示装置の画面の画像を表示させるようにしたことを特徴とするカラー表示装置の画質測定方法。

【請求項4】 請求項3に記載のカラー表示装置の画質測定方法において、
前記第2のカラー表示装置の表示画面の所定表示部に、
前記カラー表示装置の画面の画像に対する規制枠を表示させるようにしたことを特徴とするカラー表示装置の画質測定方法。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、カラーテレビ受像

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機、テレビ用カラー陰極線管、ディスプレイモニタ（コンピュータ用カラー陰極線管）、投射型ディスプレイ等のカラー表示装置に関連した製品を製造する際に、使用するカラー表示装置の画質測定装置及び画質測定方法に関する。

【0002】

【従来の技術】以下に、図4を参照して、従来のカラー表示装置の画質測定装置を説明する。1は被測定物としてのカラーテレビ受像機（テレビ用カラー陰極線管を備えている）である。尚、被測定物1は、カラーテレビ受像機の他に、テレビ用カラー陰極線管、ディスプレイモニタ（コンピュータ用カラー陰極線管）、投射型ディスプレイ等のカラー表示装置が可能である。

【0003】2は被測定物1の画面全体を撮像するカラービデオカメラ、2Lはこのカラービデオカメラの撮像レンズとしてのズームレンズで、このカラービデオカメラ2及び固定焦点レンズ2Lにて、画質センサ（カラー画質センサ）が構成される。

【0004】7Vはビデオモニタ、即ち、テレビ用のカラー陰極線管で、これにカラービデオカメラ2よりの撮像信号（画像信号）が供給されて、その画面に被測定物1としてのカラーテレビ受像機の正面が映出される。

【0005】5は画像処理回路で、カラービデオカメラ2よりの画像信号をデジタル信号に変換するA/D変換器5A及びデジタル画像信号を記憶するフレームメモリ5Bから構成されている。尚、カラービデオカメラ2からデジタル画像信号が得られる場合は、画像処理回路5中のA/D変換器5A、又は、画像処理回路5全体が不要となる。画像処理回路5のフレームメモリ5Bより読み出されたデジタル画像信号（画像データ）は、バスライン（2本の細線）を通じて、コンピュータとしてのCPU（中央処理ユニットで、プログラムが記憶されているROM、データ処理のためのRAM等を備えている）6のメモリ（図示を省略する）に転送される。

【0006】7はモニタで、コンピュータ用のカラー陰極線管からなり、CPU6に接続されている。

【0007】CPU6は、バスラインを通じて信号発生器12を制御して、測定の際に必要なパターン信号等の画像信号を発生させ、その画像信号を被測定物としてのカラーテレビ受像機1に供給して、カラー陰極線管の管面上にパターン画像等の測定に必要な画像を表示させるようにする。

【0008】例えば、画歪み（画面の幾何学的歪み）の測定の場合には、CPU6は画像の位置を画像データから算出し、その測定結果をモニタ7の画面上に、リアルタイムで、グラフィック表示させたり、測定データを数値で表示させたりする。この測定データは、CPU6の外部メモリ、例えば、ハードディスク（図示を省略）に記録させたり、ネットワークを通じてホストコンピュータ等に送信して、統計処理等に利用されるようにしても

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良い。

【0009】9は入出力インターフェースで、CPU6に接続されており、例えば、生産ラインで画質測定が行われる場合における、測定開始及び終了信号等の入出力制御や、被測定物1の画質を自動調整する場合に用いるシリアル制御信号の発生等に利用される。

【0010】以下に、図5を参照して、従来の他のカラー表示装置の画質測定装置を説明する。この図5の従来例は、図4の従来例におけるモニタ7及びビデオモニタ7Vの代わりに、兼用モニタ7Kを設けたもので、その他の部分は、図4の従来例と同様である。

【0011】図5の従来例では、走査周波数の切換え可能なカラー陰極線管を兼用モニタ7Kとして用い、カラービデオカメラ2からの撮像信号（画像信号）が兼用モニタ7Kに供給されるときと、CPU6よりの画質測定結果に基づく表示信号が供給されるときとで、兼用モニタ7Kの走査周波数を切換えるようにしている。

【0012】

【発明が解決しようとする課題】図4の従来のカラー表示装置の画質測定装置では、2台のモニタを使用しているため、1台のモニタを使用する場合に比べて、ハードウェアが複雑になる欠点がある。

【0013】又、図5の従来のカラー表示装置の画質測定装置では、カラービデオカメラからの撮像信号（画像信号）が供給されるときと、CPUよりの表示信号が供給されるときとで、走査周波数の切換え可能な兼用モニタを使用しているため、カラー表示装置の画質測定装置の価格が高くなり、好ましくない。

【0014】更に、従来のカラー表示装置の画質測定装置には、モニタに映出される被測定物としてのカラー表示装置の正面の画像を見ながら、カラービデオカメラの位置を調節する場合、カラービデオカメラの視野をどのように設定したら良いかを定める手段がなかったため、その視野設定に経験が必要であった。

【0015】かかる点に鑑み、本発明は、構成簡単、価格低廉にして、被測定物としてのカラー表示装置と画質センサ用のカラービデオカメラとの間の位置調整のためのカラービデオカメラの撮像による被測定物としてのカラー表示装置の画面の画像と、カラービデオカメラの撮像による被測定物としてのカラー表示装置の画面の画像信号に基づくコンピュータによる画質測定結果の表示とを、1個のモニタ用のカラー表示装置に表示させることのできるカラー表示装置の画質測定装置及び画質測定方法を提案しようとするものである。

【0016】又、本発明は、被測定物としてのカラー表示装置と、画質センサ用カラービデオカメラとの間の相対的な位置決めを、容易、迅速、且つ、正確に調整することのできるカラー表示装置の画質測定装置及び画質測定方法を提案しようとするものである。

【0017】

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【課題を解決するための手段】本発明は、被測定物としての第1のカラー表示装置の画面を撮像する画質センサ用のカラービデオカメラと、そのカラービデオカメラからの画像信号に基づいて、画質測定を行うコンピュータと、そのコンピュータによる画質測定結果の表示信号が供給されて表示が行われるモニタ用の第2のカラー表示装置と、コンピュータの制御に基づいて、画質測定に必要な画像信号を発生して、第1のカラー表示装置に供給する画像信号発生手段とを有し、カラービデオカメラからの画像信号をコンピュータを介して、第2のカラー表示装置に供給して、第2のカラー表示装置の表示画面の所定表示部に、第1のカラー表示装置とカラービデオカメラとの間の位置調整のための第1のカラー表示装置の画面の画像を表示させるようにする。

【0018】かかる本発明によれば、カラービデオカメラからの画像信号をコンピュータを介して、第2のカラー表示装置に供給して、第2のカラー表示装置の表示画面の所定表示部に、第1のカラー表示装置とカラービデオカメラとの間の位置調整のための第1のカラー表示装置の画面の画像を表示させる。

【0019】

【発明の実施の形態】以下に、図1を参照して、本発明の実施の形態を説明する。1は被測定物としてのカラーテレビ受像機（テレビ用カラー陰極線管を備えている）である。尚、被測定物1は、カラーテレビ受像機の他に、テレビ用カラー陰極線管、ディスプレイモニタ（コンピュータ用カラー陰極線管）、投射型ディスプレイ等のカラー表示装置が可能である。

【0020】2は被測定物1の正面全体を撮像するカラービデオカメラ、2Lはこのカラービデオカメラの撮像レンズとしての固定焦点レンズで、このカラービデオカメラ2及び固定焦点レンズ2Lにて、画質センサ（カラー画質センサ）が構成される。

【0021】5は画像処理回路で、カラービデオカメラ2よりの画像信号をデジタル信号に変換するA/D変換器5A及びデジタル画像信号を記憶するフレームメモリ5Bから構成されている。尚、カラービデオカメラ2からデジタル画像信号が得られる場合は、画像処理回路5中のA/D変換器5A、又は、画像処理回路5全体が不要となる。画像処理回路5のフレームメモリ6より読み出されたデジタル画像信号（画像データ）は、バスライン（2本の細線）を通じて、コンピュータとしてのCPU（中央処理ユニットで、プログラムが記憶されているROM、データ処理のためのRAM等を備えている）6のメモリ（図示を省略する）に転送される。

【0022】7は、ディスプレイモニタ（コンピュータ用カラー陰極線管）で、CPU6に接続されている。

【0023】CPU6は、バスラインを通じて信号発生器12を制御して、測定の際に必要なパターン信号等の画像信号を発生させ、その画像信号を被測定物としての

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カラーテレビ受像機 1 に供給して、カラー陰極線管の管面上にパターン画像等の測定に必要な画像を表示させるようにする。

【0024】例えば、画歪み（画面の幾何学的歪み）の測定の場合には、CPU 6 は画像の位置を画像データから算出し、その測定結果をモニタ 7 の画面上に、リアルタイムで、グラフィック表示させたり、測定データを数値で表示させたりする。この測定データは、CPU 6 の外部メモリ、例えば、ハードディスク（図示を省略）に記録させたり、ネットワークを通じてホストコンピュータ等に送信して、統計処理等に利用されるようにしても良い。

【0025】9 は入出力インターフェースで、CPU 6 に接続されており、例えば、生産ラインで画質測定が行われる場合における、測定開始及び終了信号等の入出力制御や、被測定物 1 の画質を自動調整する場合に用いるシリアル制御信号の発生等に利用される。

【0026】次に、カラー表示装置 1 の画質測定及びそれに基づくカラー表示装置 1 の画質調整について説明する。CPU 6 が信号発生器 12 を制御して、被測定物 1 の画面上の各測定点に測定のためのパターン画像を表示させる。次いで、被測定物 1 の画面に表示されているパターン画像全体をカラービデオカメラ 2 で撮像し、その画像信号を画像処理回路 5 に入力して、A/D 変換器 5 A でデジタル画像信号に変換した後、フレームメモリ 5 B に保存する。CPU 6 がフレームメモリ 5 B に記憶されているデータを演算して各パターン画像の位置を算出する。CPU 6 が測定結果をモニタ 7 に表示させる。操作者が表示された結果を見て、被測定物 1 の画質調整摘子を手動調整して画質調整を行うか、又は、CPU 6 が被測定物 1 を制御して、測定結果に応じて、被測定物 1 の画質調整を自動的に行う。

【0027】次に、画歪み測定について説明する。CPU 6 による信号発生器 12 の制御によって、被測定物 1 のカラー陰極線管の有効画面の全領域を発光させ、そのラスターのエッジ位置を画歪み測定の基準位置として利用する。

【0028】しかし、被測定物 1 がディスプレイモニタ（コンピュータ用カラー陰極線管）等で、画面がアンダースキャンモードに設定されている場合は、ラスター画面サイズがカラー陰極線管の有効画面より小さくなり、発光しているラスターのエッジ位置は定まらず、画歪み測定の基準位置として使用できない。その場合には、そのディスプレイモニタ（コンピュータ用カラー陰極線管）のキャビネットのベゼル（bezel）の縁を基準としなければならない。その場合には、照明用光源（図示を省略している）を用いて、被測定物 1 の画面を照明して、ベゼルの縁の位置の測定が容易に行われるようにする。尚、ディスプレイモニタ（コンピュータ用カラー陰極線管）は、通常オーバースキャンモード及びアンダース

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キャンモードの切換えが可能である。

【0029】被測定物 1 がディスプレイモニタ等の場合に、画歪み測定が開始されるまでの手順を以下に説明するが、その前に、カラー表示装置の生産ラインにおいて、この実施の形態を適用する場合において、入出力インターフェース回路 9 において必要とされる回路を、図 5 を参照して説明する。カラー表示装置の生産ラインにおいて、この実施の形態を適用する場合は、被測定物 1 が、画質センサとしてのカラービデオカメラ 2 の前に来たか否かの判定信号、又は、画質の調整検査が終了し、被測定物 1 を移動させるための制御信号の授受を、生産ラインのコンベヤーとの間で行う必要がある。この場合の信号の入出力には、入出力インターフェース回路 9 に設けたパラレル入出力回路（図示を省略する）が使用される。

【0030】（a） 先ず、被測定物 1 が、例えば、コンベヤー装置によって移動せしめられて、カラービデオカメラ 2 の前に来ると、そのコンベヤー装置からの測定開始信号が、入出力インターフェース回路 9 のパラレル入出力回路を通じて、CPU 6 に転送される。

（b） 次に、被測定物 1 の画面を発光させる前に、CPU 6 の制御（ソフトウェアプログラム）によって照明用光源を点灯させる。

（c） この照明効果によって、被測定物 1 としてのテレビ受像機のキャビネットのベゼルの縁の位置を、カラービデオカメラ 2 が明確に撮像することができ、この画像は画歪み測定の基準位置データの算出のために、CPU 6 のメモリに記憶しておく。

（d） 次に、CPU 6 の制御（ソフトウェアプログラム）によって、スイッチ 11 をオフにして、照明用光源を消灯させた後、CPU 6 の制御（ソフトウェアプログラム）による信号発生器 12 の制御によって、被測定物 1 の画面に測定用パターンを表示させて、測定を開始させる。

【0031】尚、画歪みの測定では、カラービデオカメラ 2 の緑色信号出力のみを使用する。これは、三原色の中で、緑色が人の視覚感度が最も高くなることから、モノクロームビデオカメラと同等の測定性能が得られることが分かる。

【0032】次に、被測定物としてのカラー表示装置 1 と、カラービデオカメラ 2 との間に位置合わせのあたために、カラービデオカメラ 2 からの画像信号は、画像処理回路 5 を通じて、CPU 6 に供給されて、そのメインメモリ（図示せず）に記憶されるが、このメインメモリに記憶される画像信号は、CPU 6 のプログラムによって、定期的書き換えられるようになされている。そして、メインメモリに記憶されている画像信号は、CPU 6 のプログラムによって、サンプリングされて画像縮小処理が行われて、CPU 6 のモニタ画面表示用のメモリ（ビデオ RAM）（図示せず）の所定のメモリエリアに

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転送されて、モニタ7の所定の撮像画表示部7Aa（図2参照）に表示される。

【0033】次に、図2を参照して、CPU6に接続されているモニタ7の画面の一例を説明する。図2Aにおいて、7Aは、このモニタ7の矩形の輪郭を有する画面を示す。この画面7Aに、例えば、矩形の撮像画表示部7Aaを設定し、この撮像画表示部7Aaに、後述する図3Aに示す如く、被測定物1の正面の画像を表示させるようにする。尚、この撮像画表示部7Aaに表示される被測定物1の正面の画像の表示を見ながら、カラー表示装置1とカラービデオカメラ2との間の位置調節を行い、それが終了した後は、CPU6による画質測定に基づく画質状態をグラフィック表示したり、メッセージを表示したりするのに転用される。

【0034】又、図2Aにおいて、7Abは、例えば、6個の矩形のメータ表示部で、図2Bの拡大図に示す如く、その矩形の輪郭の下辺側に目盛が設けられ、指針Iがその目盛に沿って左右方向に移動するようになされており、例えば、被測定物としてのカラー表示装置1の明るさ（BRIGHTNESS：ブライトネス）を表示する。

【0035】更に、図2Aにおいて、7Acは、例えば、矩形のクロス表示部で、二次元的な画質状態を表示するためのもので、図2Cの拡大図に示す如く、クロス表示部7Acの輪郭の各辺からの計4本の直線の交点の位置が、画質状態に応じて、水平及び垂直方向に移動する。被測定物としてのカラー表示装置1の画面の中心位置は、水平及び垂直方向の2次元要素（V. CENTER, H. CENTER）となるが、これをクロス表示部7Acで表示する。

【0036】図2のモニタ7の画面7Aの表示状態は、CPU7のプログラムによって設定される。

【0037】図2Aにおいて、7Adはメッセージ表示部で、図2Dの拡大図に示す如く、このメッセージ表示部7Adに、メッセージ、例えば、英語の文章が表示される。このメッセージの英語の文章の意味は、「ブライトネスは暗すぎる」である。

【0038】図3Aは、図2のモニタ7の撮像画表示部7Aaに、被測定物（カラー表示装置としてのカラーテレビ受像機）1の正面の画像Iが表示されている状態を示している。

【0039】図3Bは、図2のモニタ7の撮像画表示部7Aaに、それぞれ矩形の略相似形の外側及び内側規制枠Fa、Fbを表示させるようにする。そして、モニタ7の撮像画表示部7Aに表示されている被測定物の正面の画像Iの画面の略矩形のベゼルエッジ枠Bが、外側及び内側規制枠Fa、Fbの間に位置するように、被測定物1及びカラービデオカメラ2間の相対位置、即ち、例えば、被測定物1に対するカラービデオカメラ2の位置を調節する。

【0040】図3Cは、図2のモニタ7の撮像画表示部7Aに、1つの矩形の規制枠Fを表示させるようにす

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る。そして、モニタ7の撮像画表示部7Aに表示されている被測定物の正面の画像Iの画面の略矩形のベゼルエッジ枠Bが、規制枠Fにできるだけ接近するように、被測定物1及びカラービデオカメラ2間の相対位置、即ち、例えば、被測定物1に対するカラービデオカメラ2の位置を調節する。

【0041】

【発明の効果】第1の本発明によれば、被測定物としての第1のカラー表示装置の画面を撮像する画質センサ用のカラービデオカメラと、そのカラービデオカメラからの画像信号に基づいて、画質測定を行うコンピュータと、そのコンピュータによる画質測定結果の表示信号が供給されて表示が行われるモニタ用の第2のカラー表示装置と、コンピュータの制御に基づいて、画質測定に必要な画像信号を発生して、第1のカラー表示装置に供給する画像信号発生手段とを有し、カラービデオカメラからの画像信号をコンピュータを介して、第2のカラー表示装置に供給して、第2のカラー表示装置の表示画面の所定表示部に、第1のカラー表示装置とカラービデオカメラとの間の位置調整のための第1のカラー表示装置の画面の画像を表示させるようにしたので、構成簡単、価格低廉にして、被測定物としてのカラー表示装置と画質センサ用のカラービデオカメラとの間の位置調整のためのカラービデオカメラの撮像による被測定物としてのカラー表示装置の画面の画像と、カラービデオカメラの撮像による被測定物としてのカラー表示装置の画面の画像信号に基づくコンピュータによる画質測定結果の表示とを、1個のモニタ用のカラー表示装置に表示させることができる。第1のカラー表示装置の画質測定装置を得ることができる。

【0042】第2の本発明によれば、第1の本発明のカラー表示装置の画質測定装置及び画質測定方法において、第2のカラー表示装置の表示画面の所定表示部に、第1のカラー表示装置の画面の画像に対する規制枠を表示させるようにしたので、第1の本発明の効果に加えて、被測定物としてのカラー表示装置と、画質センサ用のカラービデオカメラとの位置合わせが容易、迅速、且つ、正確になるカラー表示装置の画質測定装置を得ることができる。

【0043】第3の本発明によれば、被測定物としての第1のカラー表示装置の画面を画質センサ用のカラービデオカメラによって撮像し、そのカラービデオカメラからの画像信号に基づいて、コンピュータによって画質測定を行い、コンピュータの制御によって画像信号発生手段を制御して、画像信号発生手段よりの画質測定に必要な画像信号を第1のカラー表示装置に供給させるようにし、カラービデオカメラからの画像信号をコンピュータを介して、モニタ用の第2のカラー表示装置に供給して、その表示画面の所定表示部に、第1のカラー表示装置とカラービデオカメラとの間の位置調整のための第1

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のカラー表示装置の画面の画像を表示させるようにしたので、構成簡単、価格低廉にして、被測定物としてのカラー表示装置と画質センサ用のカラービデオカメラとの間の位置調整のためのカラービデオカメラの撮像による被測定物としてのカラー表示装置の画面の画像と、カラービデオカメラの撮像による被測定物としてのカラー表示装置の画面の画像信号に基づくコンピュータによる画質測定結果の表示とを、1個のモニタ用のカラー表示装置に表示させることのできるカラー表示装置の画質測定方法を得ることができる。

【0044】第4の本発明によれば、第3の本発明のカラー表示装置の画質測定方法及び画質測定方法において、表示装置の表示画面の所定表示部に、カラー表示装置の画面の画像に対する規制枠を表示させるようにしたので、第3の本発明の効果に加えて、被測定物としてのカラー表示装置と、画質センサ用のカラービデオカメラとの位置合わせが容易、迅速、且つ、正確になるカラー

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表示装置の画質測定方法を得ることができる。

【図面の簡単な説明】

【図1】本発明の実施の形態を示すブロック線図である。

【図2】その実施の形態のモニタの画面を示す線図である。

【図3】その実施の形態のモニタの表示状態を示す線図である。

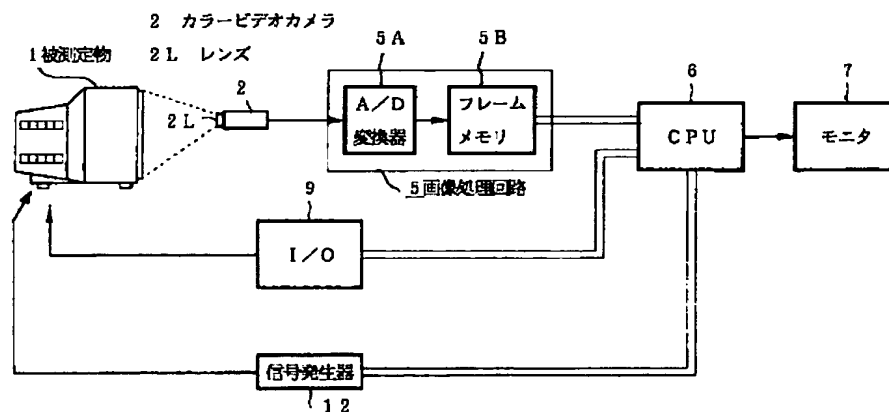
【図4】カラー表示装置の画質測定装置の従来例を示すブロック線図である。

【図5】カラー表示装置の画質測定装置の他の従来例を示すブロック線図である。

【符号の説明】

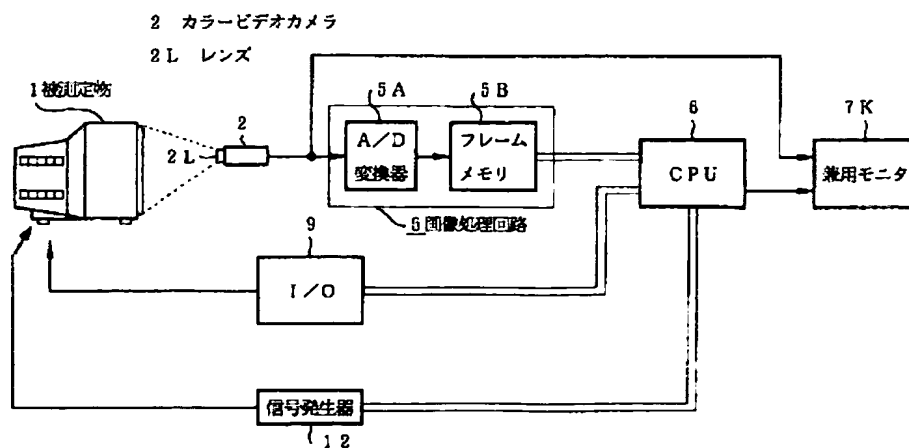
1 被測定物（カラー表示装置）、2 画質センサ用カラービデオカメラ、5 画像処理回路、6 CPU、7 モニタ、9 入出力インターフェース、12 信号発生器。

【図1】



実施の形態

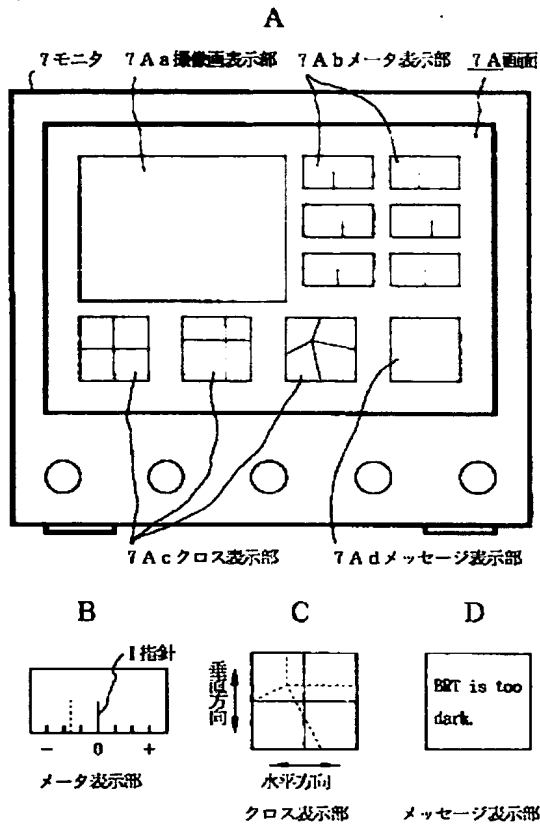
【図5】



従来例

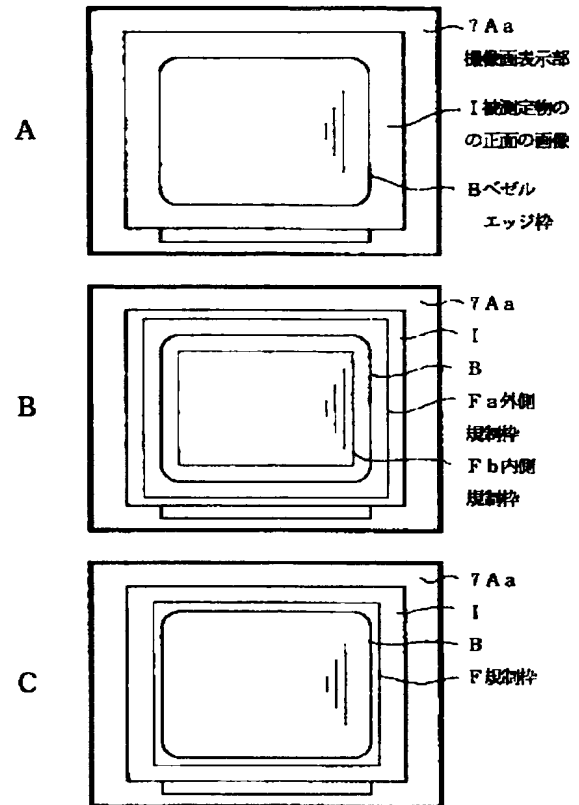
(7)

【図2】



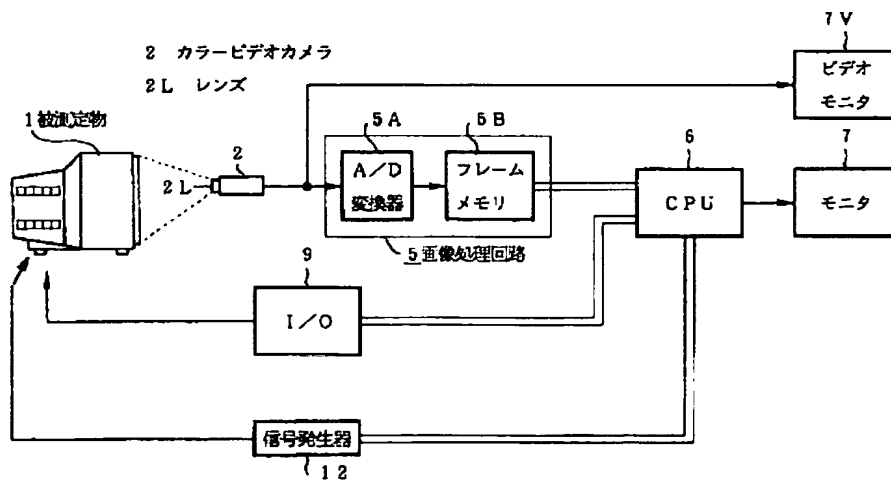
モニタの画面

【図3】



撮像画表示部の表示状態

【図4】



従来例